

## CLAIMS

Therefore, having thus described the invention, at least the following is claimed:

- 1     1.     A telemetry digital data communication system comprising:
  - 2             a central data acquisition system;
  - 3             a first telemetry device that utilizes a modem for data communication, and
  - 4             a second telemetry device;
  - 5             a two-wire data transmission line between the first telemetry device and the
  - 6             second telemetry device;
  - 7             wherein the second telemetry device comprises:
    - 8                 a processor for communicating with the first telemetry device;
    - 9                 a modem for facilitating the processor to communicate the digital
    - 10                meter data from the first telemetry device to the digital cellular radio;
    - 11                a ring voltage generator for enabling communication with the first
    - 12                telemetry device;
    - 13                a loop current generator to maintain current flow through the two-wire
    - 14                line when the second telemetry device communicates with the first telemetry
    - 15                device;
    - 16                an off-hook detector to determine whether the first telemetry device is
    - 17                in an off-hook condition;
    - 18                a dial tone generator to generate a dial tone to the first telemetry
    - 19                device;
    - 20                a dual tone multi-frequency (DTMF) digit detector to determine
    - 21                whether a DTMF digit was transmitted by the first telemetry device; and
    - 22                a digital cellular radio for communicating with the processor and the
    - 23                central data acquisition system;
    - 24                wherein the processor facilitates relaying digital meter data from the
    - 25                first telemetry device to the digital cellular radio in which the digital cellular
    - 26                radio facilitates transmitting the digital meter data to the central data
    - 27                acquisition system;

28                wherein the digital cellular radio is capable of receiving instruction  
 29                data from the central data acquisition system to transmit digital meter data  
 30                from the first telemetry device, and sending the instruction data to the  
 31                processor for relaying the instruction data and communicating with the first  
 32                telemetry device over the data communication line to transmit the digital meter  
 33                data from the first telemetry device which then transmits the data to the central  
 34                data acquisition system.

1        2.        A telemetry digital data communication system comprising:  
 2                a central data acquisition system;  
 3                at least one first telemetry device that utilizes a modem for data  
 4                communication; and  
 5                a second telemetry device for at least one first telemetry device comprising:  
 6                        a processor for communicating with the first telemetry device and  
 7                        a digital cellular radio for communicating with the processor and the  
 8                central data acquisition system;  
 9                wherein the processor relays digital meter data from the first telemetry device to the  
 10                digital cellular radio in which the digital cellular radio facilitates transmitting the  
 11                digital meter data to the central data acquisition system.

1        3.        The system as defined in claim 2 wherein the first telemetry device is a modem  
 2                equipped meter.

1        4.        The system as defined in claim 2, further comprising a two-wire  
 2                communications line between the first telemetry device and processor.

1        5.        The system as defined in claim 2, wherein the second telemetry device further  
 2                comprises a modem for facilitating the processor to communicate the digital meter  
 3                data from the first telemetry device to the digital cellular radio.

1        6.        The system as defined in claim 2, wherein the digital cellular radio is capable  
 2                of receiving instruction data from the central data acquisition system which is relayed  
 3                through the processor to the first telemetry device.

1     7.     The system as defined in claim 4, wherein the second telemetry device further  
2     comprises:  
3             a ring voltage generator for enabling communication with the first telemetry  
4     device;  
5             a loop current generator to maintain current flow through the two-wire data  
6     transmission line when the second telemetry device communicates with the first  
7     telemetry device; and  
8             an off-hook detector to determine whether the first telemetry device is in an  
9     off-hook condition.

1     8.     The system as defined in claim 2, wherein the second telemetry device further  
2     comprises:  
3             a dial tone generator to generate a dial tone to the first telemetry device; and a  
4     dual tone multi-frequency (DTMF) digit detector to determine whether a DTMF digit  
5     was transmitted by the first telemetry device.

1     9.     A data generation and acquisition system comprising:  
2             a central data acquisition system;  
3             at least one first telemetry device; and  
4             a second telemetry device for at least one first telemetry device comprising:  
5                 a processor for communicating with the first telemetry device, and  
6                 a digital cellular radio for communicating with the processor and the  
7             central data acquisition system;  
8             wherein the digital cellular radio receives instruction data from the central data  
9     acquisition system to transmit digital meter data from the first telemetry device, the  
10    digital cellular radio sends the instruction data to the processor, wherein the processor  
11    relays the instruction data and communicates with the first telemetry device over the  
12    data communication line to transmit the digital meter data from the first telemetry  
13    device which then transmits the data to the central data acquisition system.

1     10.    The system as defined in claim 9, wherein the first telemetry device is a  
2     modem equipped meter.

1 11. The system as defined in claim 9, further comprising a two-wire  
2 communications line between the first telemetry device and processor.

1 12. The system as defined in claim 9, wherein the second telemetry device further  
2 comprises a modem for facilitating the processor to relay data between the first  
3 telemetry device and the cellular radio.

1 13. The system as defined in claim 9, wherein the processor further receives the  
2 digital meter data from the first telemetry device and relays the digital meter data from  
3 the first telemetry device to the cellular radio in which the cellular radio facilitates  
4 transmitting the digital meter data to the central data acquisition system.

1 14. The system as defined in claim 9, wherein the second telemetry device further  
2 comprises:

3 a ring voltage generator for enabling communication with the first telemetry  
4 device;

5 a loop current generator to maintain current flow through the two-wire  
6 communications line when the remote telemetry device communicates with the first  
7 telemetry device; and

8 an off-hook detector to determine whether the first telemetry device line is in  
9 an off-hook condition.

1 15. The system as defined in claim 9, wherein the second telemetry device further  
2 comprising:

3 a dial tone generator to generate a dial tone to the first telemetry device; and

4 a dual tone multi-frequency (DTMF) digit detector to determine whether a  
5 DTMF digit was transmitted by the first telemetry device.

1 16. A remote telemetry device for facilitating digital communication between a  
2 modem equipped meter and a central data acquisition system, the remote telemetry  
3 device comprising:

4 a processor for communicating with the modem of the meter;

5 a digital cellular radio for communicating with the processor and the central  
6 data acquisition device;

7 a two-wire communications line between the modem equipped meter and  
8 processor;

9 a modem for facilitating the processor to communicate the digital meter data  
10 from the modem equipped meter to the cellular radio;

11 a ring voltage generator for enabling communication with the modem  
12 equipped meter;

13 a loop current generator to maintain current flow through the two-wire data  
14 transmission line when the remote telemetry device communicates with the modem  
15 equipped meter;

16 an off-hook detector to determine whether the modem equipped meter is in an  
17 off-hook condition;

18 a dial tone generator to generate a dial tone to the modem equipped meter; and

19 a dual tone multi-frequency (DTMF) digit detector to determine whether a  
20 DTMF digit was transmitted by the modem equipped meter;

21 wherein the processor relays the digital meter data from the modem of the  
22 meter to the cellular radio in which the digital cellular radio facilitates transmitting the  
23 digital meter data to the central data acquisition system;

24 wherein the cellular radio receives instruction data from the central data  
25 acquisition system to transmit the digital meter data from the modem equipped meter,  
26 the cellular radio sending the instruction data to the processor, wherein the processor  
27 relays the instruction data and communicates with the modem equipped meter to  
28 transmit the digital meter data from the modem equipped meter..

1 17. A remote telemetry device for facilitating digital communication between a  
2 modem equipped meter and a central data acquisition system, the remote telemetry  
3 device comprising:

4 a processor for communicating with the modem of the meter; and  
5 a digital cellular radio for communicating with the processor and the central  
6 data acquisition device;

7 wherein the processor relays the digital meter data from the modem of the  
8 meter to the cellular radio in which the digital cellular radio facilitates transmitting the  
9 digital meter data to the central data acquisition system.

1 18. The device as defined in claim 17, further comprising a two-wire data  
2 transmission line between the modem equipped meter and processor.

1 19. The device as defined in claim 17, further comprising a modem for facilitating  
2 the processor to relay the digital meter data from the modem equipped meter to the  
3 cellular radio.

1 20. The device as defined in claim 17, wherein the digital cellular radio is capable  
2 of receiving instruction data from the central data acquisition system and the processor  
3 relays the instruction data to the modem equipped meter for transmitting the digital  
4 meter data from the modem equipped meter.

1 21. The device as defined in claim 18, further comprising:  
2 a ring voltage generator for enabling communication with the modem  
3 equipped meter;  
4 a loop current generator to maintain current flow through the two-wire data  
5 transmission line when the remote telemetry device communicates with the modem  
6 equipped meter; and  
7 an off-hook detector to determine whether the modem equipped meter is in an  
8 off-hook condition.

1 22. The device as defined in claim 17, further comprising:  
2 a dial tone generator to generate a dial tone to the modem equipped meter; and  
3 a dual tone multi-frequency (DTMF) digit detector to determine whether a  
4 DTMF digit was transmitted by the modem equipped meter.

1 23. A remote telemetry device for facilitating digital communication between a  
2 modem equipped meter and a central data acquisition system, the remote telemetry  
3 device comprising:  
4 a processor for communicating with the modem of the meter; and  
5 a cellular radio for communicating with the processor;  
6 wherein the cellular radio receives instruction data from the central data  
7 acquisition system to transmit the digital meter data from the modem equipped meter,  
8 the cellular radio sending the instruction data to the processor, wherein the processor  
9 relays the instruction data and communicates with the modem equipped meter to  
10 transmit the digital meter data from the modem equipped meter.

1 24. The device as defined in claim 23, further comprising a two-wire data  
2 transmission line between the modem equipped meter and processor.

1 25. The device as defined in claim 23, further comprising a modem for facilitating  
2 the processor to relay the digital meter data from the modem equipped meter to the  
3 cellular radio.

1 26. The device as defined in claim 23, wherein the processor further receives the  
2 digital meter data from the modem equipped meter and relays the digital meter data  
3 from the modem to the cellular radio in which the cellular radio facilitates  
4 transmitting the digital meter data to the central data acquisition system.

1     27.     The device as defined in claim 24, further comprising:  
2             a ring voltage generator for enabling communication with the modem  
3     equipped meter;  
4             a loop current generator to maintain current flow through the two-wire line  
5     when the remote telemetry device communicates with the modem equipped meter;  
6     and  
7             an off-hook detector to determine whether the modem equipped meter is in an  
8     off-hook condition.

1     28.     The device as defined in claim 23, further comprising:  
2             a dial tone generator to generate a dial tone to the modem equipped meter; and  
3             a dual tone multi-frequency (DTMF) digit detector to determine whether any  
4     DTMF digit was transmitted by the modem equipped meter.

1     29.     A method for facilitating digital communication between a modem equipped  
2     meter and a central data acquisition system, the method comprising the steps of:  
3             detecting incoming calls from the central data acquisition system;  
4             generating ring voltage to the modem equipped meter;  
5             generating a dial tone to the modem equipped device;  
6             detecting whether the modem equipped meter is off hook;  
7             detecting dual tone multi frequency (DTMF) from the modem equipped meter;  
8             dialing a digital cellular radio for communicating with the central data  
9     acquisition system;  
10            receiving instruction data from the central data acquisition system for  
11     transmitting data from the modem equipped meter;  
12            establishing a bi-directional communication pathway that relays data between  
13     the modem equipped meter and the central data acquisition system, and  
14            terminating the pathway.



1 30. A method for facilitating digital communication between a modem equipped  
2 meter and a central data acquisition system, the method comprising the steps of:  
3 detecting whether the modem equipped meter is off hook;  
4 establishing a bi-directional communication pathway that relays data between  
5 the modem equipped meter and the central data acquisition system; and  
6 terminating the pathway.

1 31. The method as defined in claim 30, wherein the relaying of data is facilitated  
2 by a processor.

1 32. The method as defined in claim 30, wherein the relaying of data from modem  
2 equipped meter to the central data acquisition system includes transmitting the data  
3 via a digital cellular radio.

1 33. The method as defined in claim 30, further comprising dialing the digital  
2 cellular radio for communicating to the central data acquisition system.

1 34. The method as defined in claim 30, further comprising:  
2 generating a dial tone to the modem equipped device; and  
3 detecting dual tone multi frequency (DTMF) from the modem equipped meter.

1 35. The method as defined in claim 30, further comprising:  
2 detecting incoming calls from the central data acquisition system;  
3 generating ring voltage to the modem equipped meter; and  
4 causing a digital cellular radio to answer the incoming calls.

- 1 36. The method as defined in claim 30, further comprising receiving instruction
- 2 data from the central data acquisition system for transmitting data from the modem
- 3 equipped meter.